

To reduce the examination time for MRI of tibia and fibula studies to detect infection

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Mission Statement

- To increase the percentage of patients who have their MRI tibia and fibula scans with contrast (to detect infection) completed within the allotted time (1 hour)* from currently 14.7% to 75 % or higher within six months (stretch goal -to complete 75% of patient scans in 45 minutes within one year).
- * - MRI room- door to door time (shifting in + scan time + shifting out).

Team Members

	Name	Designation	Department
Team Leader	Dr. Manickam Subramanian	Consultant	DDR/KTPH
Member	Dr. Nicholas Ong	Consultant	DDR/Woodlands Health
Member	Dr. Saksham Bansal	Resident Physician	DDR/KTPH
Member	Ms. Shu Ting	Senior MR Radiographer	DDR/KTPH
Member	Mr. Wong Kin Loon	Junior MR Radiographer	DDR/KTPH
Member	Ms. Azelea	Patient Service Associate	DDR/KTPH
Sponsor	Dr. Paul See	Head of Department	DDR/KTPH
Facilitator	Dr. Loh Seow Siang	Senior consultant	Acute and Emergency care/KTPH

Evidence for a Problem Worth Solving

The appointment slot time allotted in KTPH is one hour and average time to complete the study is currently 75 minutes*

Local hospitals appointment slots:

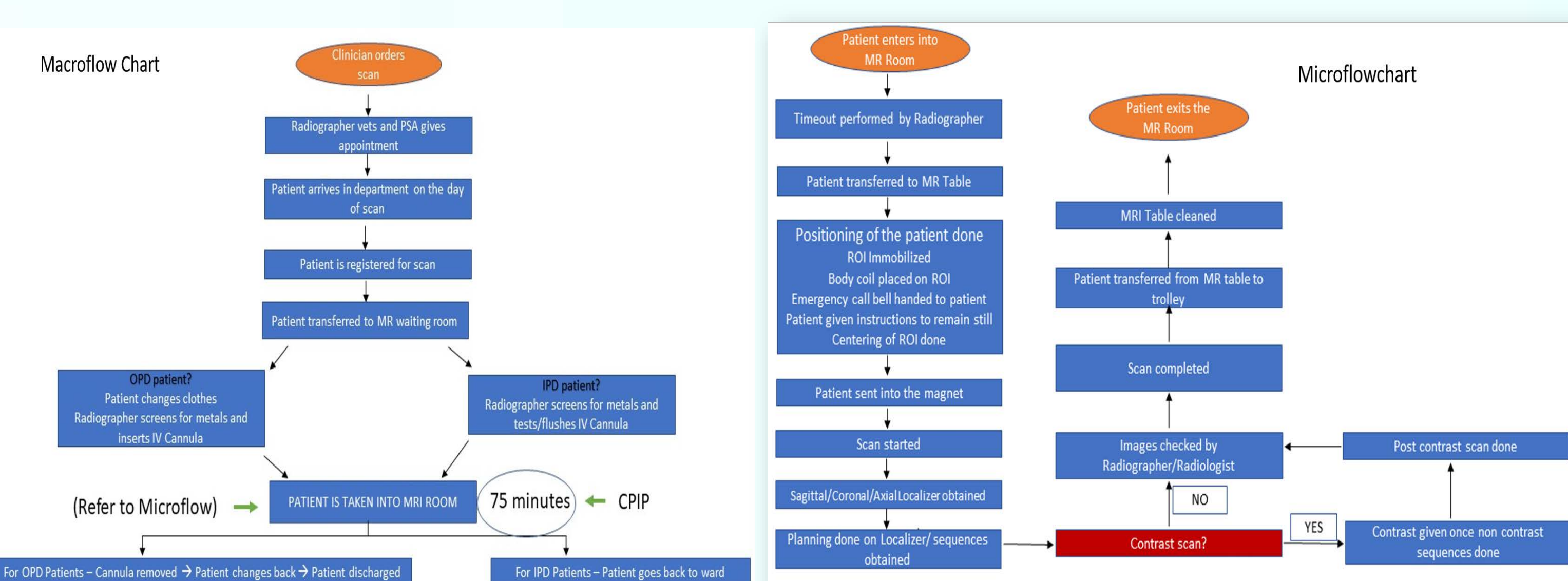
Tan Tock Seng Hospital -30-40 minutes

Changi General Hospital -30-45 minutes

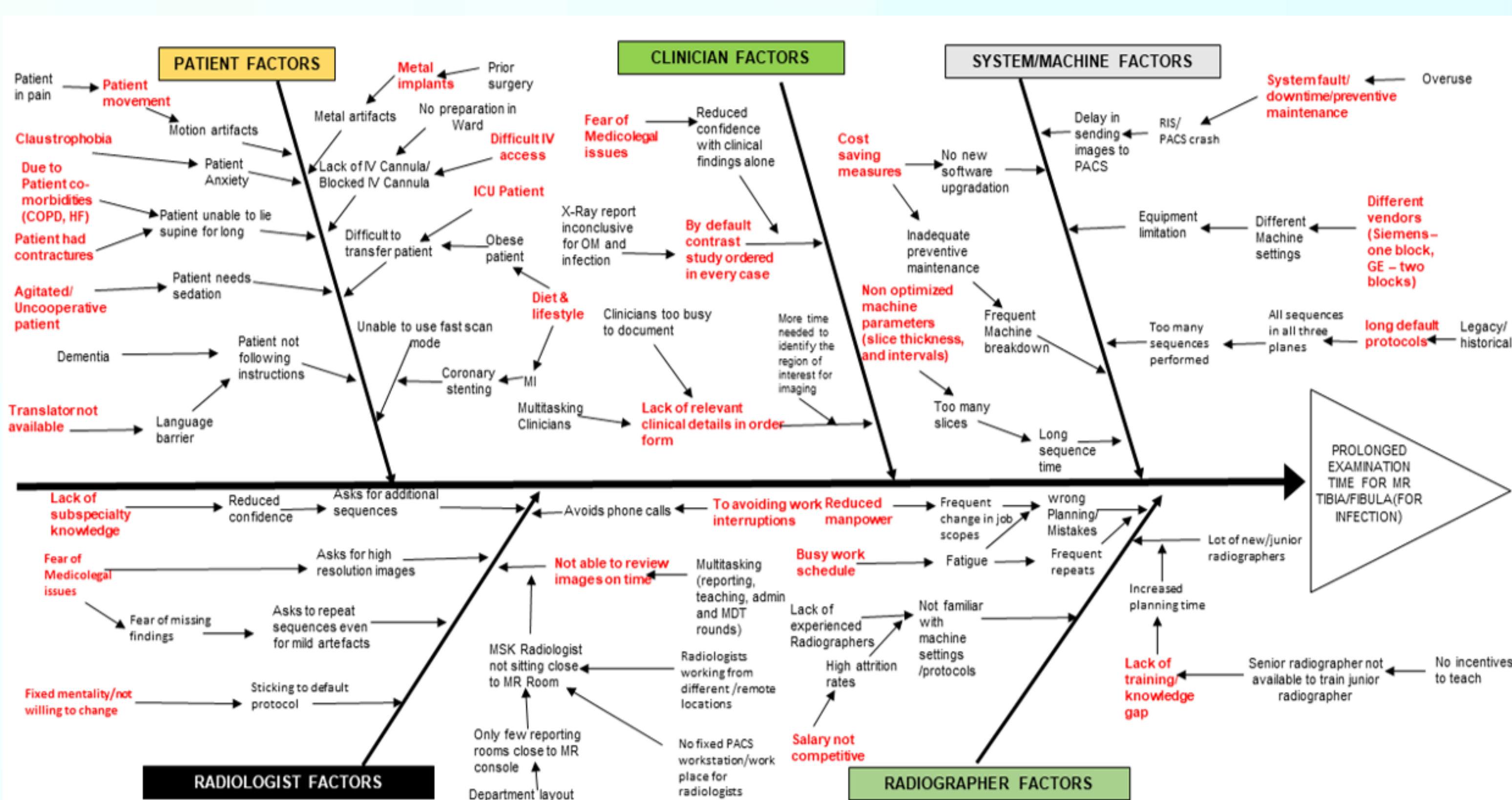
National University Hospital – 30-40 minutes

* Calculated mean examination time over 3 months (July to September, 2023) for patients undergoing MR studies of tibia and fibula.

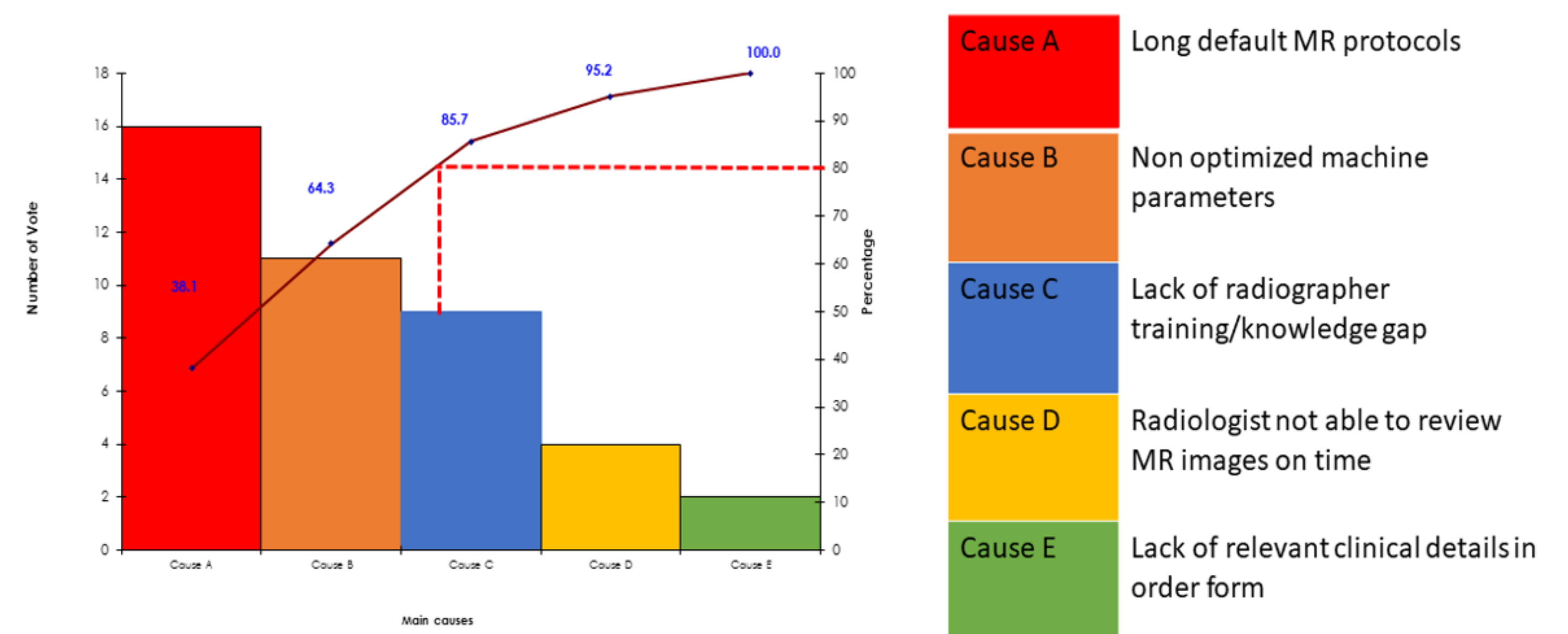
Flow Chart of Process



Cause and Effect Diagram



Pareto Chart

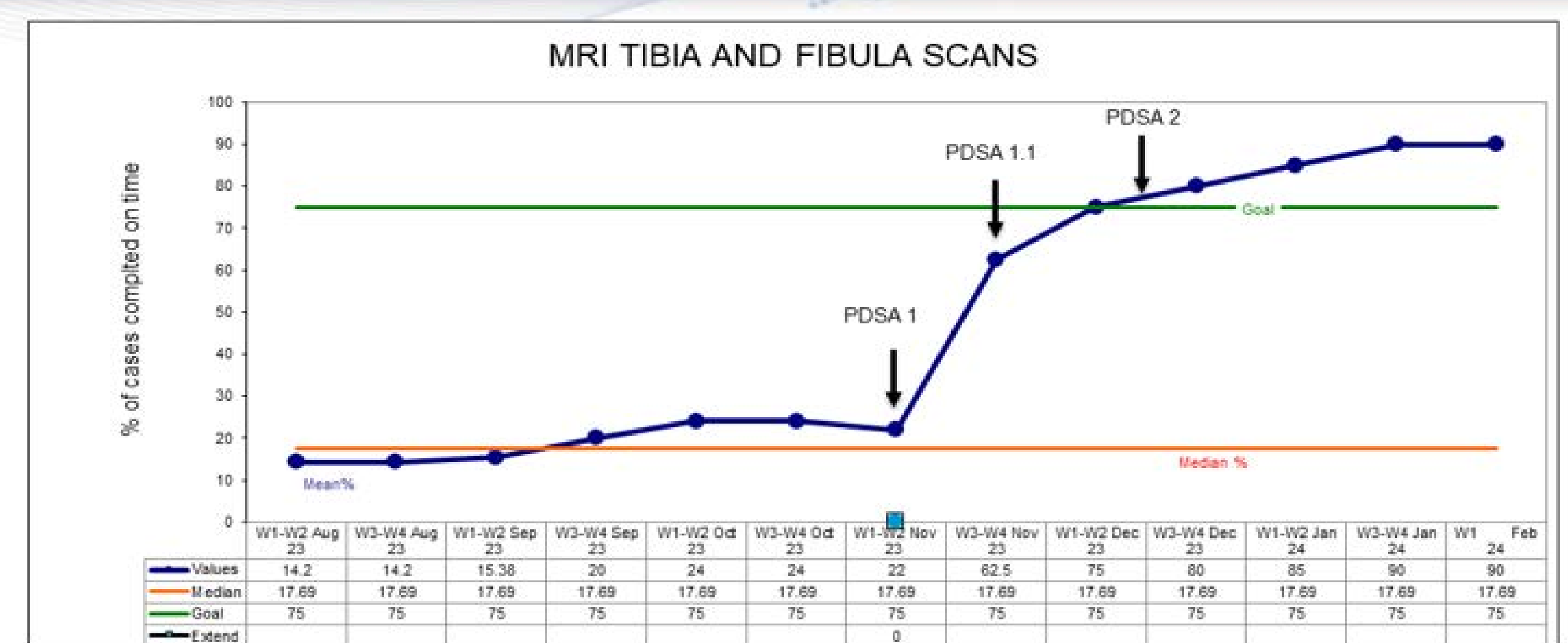


Implementation

Problem	Interventions	Date of implementation
Long default MR protocol	Remove redundant sequences from the MR protocol which are not adding values or additional information	19 Nov 2023
Lack of radiographer training/ Knowledge gap	All MR radiographers were trained by CPIP team members with intended change in the MR infection protocol.	19 Nov 2023
Non optimized machine parameters	Optimize the machine parameters such as slice thickness and slice intervals aiming to further reduce sequence timing	26 Dec 2023

Results

RUN chart with PDSA cycles



Cost Savings

- **MR machine Time saved from MRI tibia and fibula study:**
- 30 minutes per patient, 8-9 hours per month, 100-120 hours per year
- **Utilizing the time:**
- 10 more MRI tibia and fibula infection studies or 20 MR stroke protocols/Pelvis fracture screenings can be performed additionally potentially generating/saving around 500-700 SGD per patient and 70-80 thousand SGD per year.

Problems Encountered

- Radiographers forgot to follow new protocol for few patients in PDSA cycle 1. All MR radiographers were not in the CPIP team, so need reinforcement.
- Few Radiologists wanted at least one sequence in Sagittal plane and asked to modify the MR protocol.
- Few patients were un-cooperative so scan time exceeded, difficult to change patients causes and team decided to adapt the workflow as it was efficient in all other cases.

Strategies to Sustain and scaling measures

- Regular feedbacks were sought from the Radiographers, Radiologists and Referring clinicians.
- Continuous monitoring and regular audits are in place to sustain changes and to prevent any adverse events or missed diagnosis.
- Adapt the changes in to regular work flow.
- Try to expand to other MSK MR protocols.